

# PDR RID Report

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**Document**

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<b>Review</b>	CSMS	
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<b>Priority</b>	1	

Section	Page	Figure Table
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<b>Category Name</b>	Design-CSS	<b>Actionee</b>	HAIS
<b>Sub Category</b>	System time sync		
<b>Subject</b>	ECS network time synchronization		

## **Description of Problem or Suggestion:**

The architecture to provide system wide time synchronization appears to not be thought out adequately, and needs rethinking. V0 system time compatibility issues not addressed.

## **Originator's Recommendation**

Several alternative strategies exist which may be more effective at meeting system requirements:

- 1) NTP is widely used in the Internet community (and in the V0 system) and many COTS products support it, so why not use it instead of DTS?
- 2) Is DCE locked into DTS for time support? If so, why not use NTP to provide time sync, and have DTS clients on each system slaved to NTP?
- 3) Why not buy cheap WWVB or GOES clocks for each DCE cell and sync that way, rather than being tied to a central source?
- 4) Examine true system requirements for time accuracy, and ensure trades are made appropriately.
- 5) A level 4 requirement may exist to ensure that host time adjustments are always made by adjusting clock rate, and never by resetting time to an earlier value.

## **GSFC Response by:**

## **GSFC Response Date**

**HAIS Response by:** Forman

**HAIS Schedule** 2/10/95

**HAIS R. E.** Winston

**HAIS Response Date** 2/10/95

CSS is presenting a design that provides an NTP server feed at every DAAC, the EOC, and the isolation cell. The NTP server will function as the System Time Provider source to the DCE DTS Servers within each DCE cell. Alternatives are now being evaluated regarding the source for these Time Servers. The alternatives include NASA-36 or GPS. CSMS feels that this approach will allow V0 and DTS interoperability and a NASA-36 or GPS source will provide a single time for the entire network.

These alternatives for time sources will be evaluated by the FOS CDR. This design will be coordinated with FOS and SDPS before CDR presentations.

### **Re. Recommendation 1:**

DTS is available and is an integral part of the DCE development package. The purchase of additional COTS packages to replace DTS with NTP is redundant and not cost effective.

Regarding V0 interoperability, CSS will verify that NTP and DTS servers can coexist. The implications of this were mentioned at PDR by Art Gaylord. CSMS will investigate the issues involved in this possibility.

### **Re. Recommendation 2:**

One of DCE's most important features is that it is a managed environment. One of its' administrative features is that it checks for the presence of DTS servers, because of this DTS can be considered "locked into" the DCE environment. Furthermore, the system also checks that the DTS servers are accurate. Unlike other COTS products, DTS measures the inaccuracy of the distributed time. If a DTS server is found to be out of range the system will remove the server from the system. It is unclear why we would disable a managed and integrated capability of the system for an unmanaged and possibly incompatible one.

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### **Re. Recommendation 3:**

While WWVB and GOES clocks are valid candidates for Time Providers, they do not provide a single system time source. A single source is considered desirable for a number of reasons. The typical uses of distributed time include event scheduling

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we would disable a managed and integrated capability of the system for an unmanaged and possibly incompatible one.

## Re. Recommendation 3:

While WWVB and GOES clocks are valid candidates for Time Providers, they do not provide a single system time source. A single source is considered desirable for a number of reasons. The typical uses of distributed time include event scheduling, event sequencing and event reporting. Applications of these type that are distributed between DCE cells require a single time source to retain their semantics. For example:

- a sequencing program that directs the transmission of data products to occur at a certain time requires that both sites share the same time;
- a systems management application measuring the throughput rate for a large data set sent between cells requires time stamps from the origination and destination sites, in order to compare the time stamps the cells must share a single time source.

CSMS is evaluating the use of Time Servers that are sourced by NASA-36 or GPS these approaches are expected to be more expensive than WWVB or GOES clocks.

## Re. Recommendation 4:

While no Level 3 Requirements exist specifically regarding time accuracy, CSS will coordinate with FOS and SDPS to develop a Level 4 requirement concerning ECS system clock source and time resolution.

## Re. Recommendation 5:

The Distributed Time Service (DTS) synchronizes the system clock on each host by directly adjusting the time kept by the operating system. Under ordinary circumstances, this is done gradually so that there are no sudden jumps in the time. It is also done in such a way that the time never goes backward. If a system clock is too far ahead, it is slowed down until the time is correct by modifying the tick increment. In other words, if a clock is normally incremented 10 milliseconds at each clock interrupt, and the clock is ahead, then the clock register will instead be incremented 9 milliseconds at each clock time until it reaches the correct time.

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**Status Closed**

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**Sponsor Broder**

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**Attachment if any**

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